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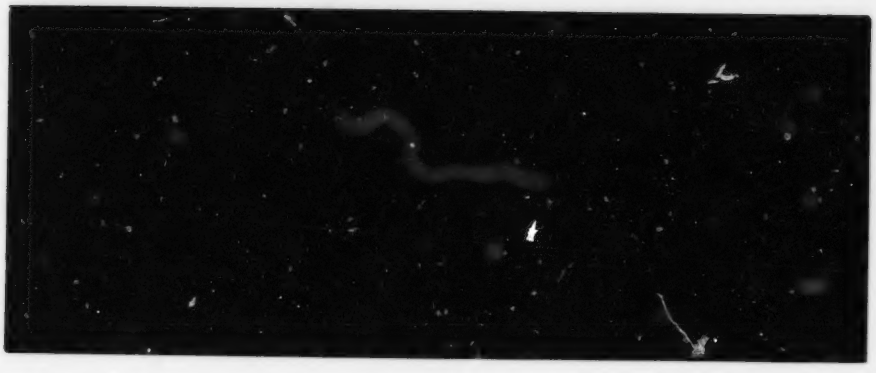

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Final Report

V-88-06-0180

Blood Testing in Saskatchewan Poultry

Conducted by

C. Riddell

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BLOOD TESTING IN SASKATCHEWAN POULTRY

V88-06-0180

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EXECUTIVE SUMMARY

BLOOD TESTING IN SASKATCHEWAN POULTRY

V 88-06-0180

ABSTRACT

Serology was used to study the effectiveness of vaccination and incidence of specific diseases in Saskatchewan poultry flocks. A satisfactory response to double vaccination against fowl cholera was found in most broiler breeder flocks. Most turkey flocks were found to be free of infection from influenza, Newcastle disease and Mycoplasma infection.

Evidence of chicken anemia agent infection was found in many broiler chicken flocks but it appeared to be less significant as a cause of poor performance than infectious bursal disease.

SUMMARY

Blood testing was conducted on 30 broiler breeder, 24 turkey and 23 broiler chicken flocks. In the broiler breeder flocks the ELISA test was used to measure the effectiveness of vaccination against fowl cholera. Two vaccinations were needed to obtain a satisfactory level of protection against fowl cholera. The test was of limited use in diagnosing disease outbreaks. In the turkey flocks the agar gel plate test, the serum plate test and the ELISA test were used to monitor for the presence of common respiratory

pathogens, influenza, Mycoplasma synoviae, gallisepticum and meleagridis, and Newcastle disease respectively. No evidence was found of infection with the first three pathogens. Evidence of infection with Mycoplasma meleagridis was found in only 2 flocks. The results of testing for the presence of Newcastle disease were suspicious of infection in several flocks. It is suspected that these may represent false reactors but further study is warranted. In the broiler chicken flocks the ELISA test was used to monitor for the presence of infectious bursal disease and infectious bronchitis while the indirect immunofluorescent test was used to monitor for the presence of chicken anemia agent. Evidence of infection with chicken anemia agent was found in 15 of 24 flocks. There was no conclusive evidence that infection with this agent caused poor performance but it appeared that infection with infectious bursal disease may cause poor performance.

The study demonstrated the usefulness of blood testing in determining the incidence and significance of specific diseases and the effectiveness of vaccination programs in the Saskatchewan Poultry Industry. The data obtained on the incidence of and antibody titers against important poultry infectious diseases in Saskatchewan will be useful to the poultry extension service at the University of Saskatchewan in advising on disease control programs and in recommending which diseases warrant future field study and research.

TECHNICAL REPORT

BLOOD TESTING IN SASKATCHEWAN POULTRY

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ABSTRACT

Serology was conducted on 30 broiler breeder, 24 turkey and 23 broiler chicken flocks. In the broiler breeder flocks the ELISA test was used to measure the incidence of and the effectiveness of vaccination against fowl cholera. Two vaccinations were needed to obtain a satisfactory titer against Pasteurella multocida. Titers following disease outbreaks were very variable. In the turkey flocks the agar gel plate test, the serum plate test and the ELISA test were used to monitor for the presence of common respiratory pathogens, influenza, Mycoplasma synoviae, gallisepticum and meleagridis, and Newcastle disease, respectively. No evidence was found of infection with the first three pathogens. Evidence of infection with Mycoplasma meleagridis was found in 2 flocks. Very low titers of antibodies against Newcastle disease were found in several flocks. It is suspected that these may represent false reactions. In the broiler chicken flocks the ELISA test was used to monitor for the presence of infectious bursal disease and infectious bronchitis while the indirect immunofluorescent test was used to monitor for the presence of chicken anemia agent. Antibodies against chicken anemia agent were found in 15 of 24 flocks. No significant correlation was found between poor performance and presence of infection with chicken anemia agent. A

significant correlation was found between poor performance and high titers of antibody against infectious bursal disease virus.

BACKGROUND AND OBJECTIVES

In the past decade there has been rapid development of techniques for determining from blood samples whether or not an animal has been infected with a specific disease and the level of protection produced by specific vaccination programs. The enzyme linked immunoabsorbent assay or ELISA test has been developed commercially to rapidly test large numbers of blood samples from poultry. In 1987 and 1988 a study utilizing the ELISA test was conducted to establish the prevalence and significance of infectious bursal disease and reovirus infection in broiler flocks and to monitor the effectiveness of vaccination programs against infectious bronchitis and Newcastle disease in leghorn flocks and against avian encelphalomyelitis and infectious bursal disease in broiler breeder and leghorn flocks (6). This study produced useful information which has been used by the poultry extension service at the University of Saskatchewan to make recommendations for disease control and, in particular, modification of vaccination programs. The technology has since been adopted by the industry, which is using ELISA testing as an ongoing monitoring tool. The current study is an expansion of the previous study. It was designed to investigate the use of the ELISA and other blood tests to monitor vaccination against fowl cholera in broiler breeder flocks and to survey for the presence of respiratory pathogens in turkey flocks and chick anemia agent in broiler flocks.

EXPERIMENTAL METHODS

The significance of various infectious diseases and the vaccination programs utilized to control these diseases vary between different segments of the Saskatchewan poultry industry. As a result, different protocols were designed for broiler breeder, turkey, and broiler chicken flocks. Each of these types of poultry will be discussed separately.

Broiler Breeder Flocks. Fowl cholera has been a significant cause of mortality in broiler breeder flocks in Saskatchewan. In some instances it has been suspected that it may also contribute to poor egg production. Several different vaccines and vaccination programs can be used to prevent outbreaks of fowl cholera. The objectives of this study were to evaluate the usefulness of the ELISA test in studying the incidence of fowl cholera and the effectiveness of different vaccination programs in protecting against fowl cholera in Saskatchewan broiler breeder flocks. 30 flocks were sampled and 20 bloods collected at each sampling time. Samples were taken at 10 weeks of age prior to any vaccination or disease outbreaks, at 17-19 weeks subsequent to an initial vaccination at 10-14 weeks but prior to any disease outbreaks, and after 20 weeks subsequent to a booster vaccination at 18 to 20 weeks and subsequent to disease outbreaks in unvaccinated flocks. Sera were separated from the bloods and submitted for testing for antibodies against *Pasteurella multocida*, the cause of fowl cholera.

Turkey flocks. The turkey industry in Saskatchewan suffers considerable economic loss as a result of carcasses being condemned at processing because

of airsacculitis. This study was conducted to determine whether unrecognized subclinical disease due to common respiratory pathogens may predispose flocks to airsacculitis. Blood samples were collected from 24 flocks on nine different farms. 10-20 bloods were collected from each flock between 10-19 weeks of age, close to processing when possible. Sera were separated and tested for antibodies against Newcastle disease using the ELISA test, for antibodies against influenza using the agar gel plate test and for antibodies against Mycoplasma meleagridis, synoviae and gallisepticum using the serum plate test.

Broiler chicken flocks. Recently a new infectious agent called chicken anemia agent has been reported to cause production problems for the broiler industry in Europe and the United States (4,5). An indirect immunofluorescent test for antibodies against chicken anemia has been prepared by Dr. M.S. McNulty, Veterinary Research Laboratories, Stormont, Northern Ireland. Dr. McNulty kindly offered to test sera from Saskatchewan. Bloods were collected from 12 broiler flocks with unexplained performance problems and from 11 flocks with normal performance and sera shipped to Northern Ireland. The ELISA test was used to also test the sera for antibodies against infectious bursal disease and infectious bronchitis which had both been shown to be associated with production problems in the previous survey (6).

RESULTS AND DISCUSSION

Broiler Breeder Flocks. Mean titers are summarized in Table 1. In unvaccinated flocks which did not experience outbreaks of fowl cholera, mean titers were low and ranged from 37-604 with the exception of an anomalous mean titer in one flock of 2600. This high mean titer was due to a very high titer of 49883 in a single bird. This unusual titer is difficult to explain and may have been due to a laboratory error. In flocks vaccinated only once mean titers were not greatly increased. The mean titers in such flocks ranged from 42-1250. Flocks vaccinated twice with either two live vaccines or a live and a killed vaccines had higher mean titers which ranged from 2417 to 4178 with one anomalous titer of 584 in a single flock. It is presumed that this flock was incorrectly vaccinated. The higher titers obtained with double vaccination agrees with previous experimental studies. Such higher titers are probably necessary for maximum protection (2). Birds vaccinated twice with 2 killed vaccines had the highest mean titers which ranged from 8742 to 13570. No confirmed outbreaks of fowl cholera followed use of a live vaccine while an outbreak did occur subsequent to the use of two killed vaccines. This observation was not unexpected as it has been shown previously that live vaccines may provide broader protection than killed vaccines against fowl cholera (3). In outbreaks of Fowl Cholera in unvaccinated flocks, mean titers were very variable and ranged from 126 to 3179. This may be explained by a proportion of the birds not becoming infected in a natural outbreak. As a result if only a small number of birds are sampled an outbreak may not be identified on the basis of serology.

Table 1. Summary of mean titers against fowl cholera in breeder flocks in Saskatchewan utilizing the ELISA test.

Age in Weeks	10	17 - 19	> 20
No vaccination or disease outbreak	$200^{A}\pm111^{B}(12)^{C}$	126±66(3)	470±583(17)
1 live vaccine at 10-14 weeks	---	586±471(6)	226±0(1)
2 live vaccines at 10 and 20 weeks	---	---	3082±0(1)
1 live vaccine and 1 killed vaccine at 10-14 and 18-20 weeks	---	---	2767±1104(7)
2 killed vaccines at 10 and 20 weeks of age	---	---	11229±2241(4)
Not vaccinated, disease outbreak	---	---	1435±1100(6)

A = Mean; B = Standard Deviation; C = Number of Flocks.

Turkey flocks. Results are summarized in Table 2. Most flocks were relatively free of antibodies against common respiratory diseases. No evidence was found of infection with influenza virus which has been causing significant losses for the turkey industry in Minnesota (1). All flocks were free of infection with Mycoplasma gallisepticum and synoviae and evidence of Mycoplasma meleagridis infection was only found in two flocks. At the time the survey was being conducted Ontario was reporting a severe problem with Mycoplasma synoviae (7). In several flocks one to three birds out of twenty tested had very low but suspicious titers against Newcastle disease. It is suspected that these were false reactions but further investigation is warranted.

Chicken Broiler Flocks. Results are summarized in Table 3. The testing indicated that chicken anemia agent is present in many Saskatchewan broiler chicken flocks. The number of negative flocks was greater in flocks with normal performance (5/11) than in flocks with poor performance (3/12) but this difference was not significant using the chi-square teset. A much greater correlation was apparent between poor performance and high titers of antibody against infectious bursal disease. The chi-square test indicated that the difference in number of flocks with titers greater than 2000 between the two groups was significant. These results confirm the previous study in which it was suggested that infection with infectious bursal disease can affect performance (6).

Table 2. Summary of serology results monitoring for common respiratory diseases in turkeys in Saskatchewan.

Farm	Influenza	Newcastle Disease	Mycoplasma meleagridis	Mycoplasma synoviae	Mycoplasma gallisepticum
A	---	---	N.T.	---	---
B	---	S	---	---	---
C	---	S	+	---	---
D	---	S	---	---	---
E	---	S	---	---	---
F	---	---	---	---	---
G	---	S	+	---	---
H	---	S	---	---	---
I	---	---	---	---	---

--- = Negative; + = Positive; S = Suspicious; N.T. = Not tested

Table 3. Summary of serology against infectious bursal disease, infectious bronchitis and chicken anemia agent in Saskatchewan chicken broiler flocks.

		Infectious Bursal Disease[a]		Infectious Bronchitis[a]		Chicken Anemia Agent[b]
	Flock	Titer	C.V.(%)	Titer	C.V.(%)	
	A	5233	21.6	439	146.3	3/5
	B	1903	52.5	105	260.3	4/5
Poor	C	2919	27.9	24	197.1	1/5
Performance	D	3332	52.5	223	170.5	1/5
	E	4805	28.6	211	278.9	4/5
	F	2260	32.5	87	232.0	4/5
	G	4185	30.8	380	105.4	3/5
	H	2586	40.9	137	85.6	0/5
	I	3348	49.1	2056	124.5	2/5
	J	4020	24.7	59	116.6	0/5
	K	7032	27.2	192	49.4	0/5
	L	1776	47.5	315	85.7	5/5
	M	862	62.7	368	26.7	0/5
	N	299	144	433	46.8	0/5
Normal	O	68	132.4	56	163.4	2/5
Performance	P	222	136.2	1318	116.3	1/5
	Q	376	65.6	38	375.4	2/5
	R	220	47.8	1151	86.8	2/5
	S	694	102.3	4781	48.6	0/5
	T	521	72.4	427	35.5	4/5
	U	498	152.4	81	165.7	2/5
	W	5267	12.5	2054	63.9	0/5
	X	1730	96.8	6680	65.0	0/5

[a] = ELISA test; [b] = Indirect immunofluorescent test. Denominator represents number of sera examined and Numerator number of positive sera.

CONCLUSIONS AND IMPACT

The study further demonstrated the usefulness of the ELISA test in determining the incidence and significance of specific diseases and the effectiveness of vaccination programs in the Saskatchewan Poultry Industry. Some segments of the industry have started to use the test as a regular monitoring procedure for quality control. The study demonstrated that the ELISA test could be used to monitor vaccination against fowl cholera but may have limited use in determining the prevalence of the disease. Subclinical respiratory disease appears to have limited importance in turkey flocks in Saskatchewan. Chicken anemia agent is widespread in Saskatchewan broiler flocks but no conclusive evidence was obtained that it is causing poor performance. Infectious bursal disease is probably more important in this context. The data obtained on the incidence of and antibody titers against important poultry infectious diseases in Saskatchewan will be useful to the poultry extension in advising on disease control programs and recommending diseases which warrant future field study and research.

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Talks given. No talks have been given to date but it is planned to present and discuss the results at regional meetings with turkey, broiler chicken and hatching egg producers held throughout Saskatchewan in the fall of 1990.

List of Personnel

	Position	Period	Percent.Time
C. Riddell	Professor	Jan. - Dec. 1989	5
R. Goodhope	Extension Poultry Veterinarian	Jan. - Dec. 1989	5
R. Springer	Technician	May - Sept. 1989	50
D. Kirk	Technician	Oct. - Dec. 1989	50